

SOIL CONSERVATION

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TAKING firm root in rural America—spreading like a healthy kudzu vine—is a new concept of land use. Rarely, if ever, has an agricultural principle or program or philosophy germinated so surely, so quickly, or in so many environments. Down the dusty aisles of cotton it seeds and propagates; out across the amber wheat belt and in the tasseled corn, up hundreds of winding country lanes, along the interminable barbed fences of western ranches.

Ideas are trail-blazers of human progress. Ideas, as distinguished from things. And it is a pioneer idea—an idea which states the logic and traces the broad pattern of a permanent husbandry—which has its blueprint in the soil conservation districts.

The mechanics of soil conservation districts have been discussed too frequently, are now too well understood, to warrant repetition here. Special legislation recently enacted in 35

new patterns of land use in two southern states... by wellington brink

States gives to such districts the status and the facilities they require to function, and opens the way to better land use through considered planning. Wherever there are districts, they are the creation of the farmers—the tenants and the owners—within their borders. Districts follow the democratic tradition; their impulse, their existence, their direction and control are at the crossroads ballot box.

HOW does the district idea work out, as it moves from theory to practice, from paper to farm?

In one form or another, the question repeats itself. A train window frames the wayside ravages of erosion, an automobile passes a demonstration farm with grassed waterways, contoured strips and curved terraces. More often than not, discussion thereupon turns to the necessity of better land use to the future of the whole people.

But can farmers cooperate among themselves? is asked. Will they avail themselves of sound technique? These are two important requisites to the success of the district program.

In search of answers, I went to Arkansas. And then I went to Georgia. These two States got off to an early start in the great experiment. Each is an agricultural laboratory of varied soils, topography, economic and social conditions. Each has its problem areas, its

prosperity zones. In April I spent two weeks talking with farmers, with county agents, with bankers, with district supervisors. I tramped along terraces and pasture furrows, walked knee deep in crimson clover, climbed over wire and rail fences to examine the mending effects of kudzu, lespedeza, and Bermuda. Here in the soil conservation districts of Arkansas and Georgia I saw not only the farmer at the plow handles but the forces at his side.

I SAW money being loaned by the Farm Security Administration, so that the tenant farmer can pay a few years' rent in advance, and the landlord, in turn, can finance long-time soil-improvement measures and pay for house repairs and new barns.

I saw county agents working out Triple-A payments for permanent conservation work.

I saw Smith-Hughes teachers, newspapers, chambers of commerce, county commissioners, pushing the educational phase, making of the district an all-community enterprise.

I saw Civilian Conservation Corps planting trees, building check dams, putting roads in usable condition, protecting them from future washing, making markets readily accessible to small homesteads in the hills.

I saw Soil Conservation men "running lines," writing agreements, giving technical assistance and leadership.

THIS article purposes to be an eyewitness account. And because I do not think too rosy a picture would serve the cause of better land use, I shall not try to depict a millennium. Time, space, and cash income are hard, uncompromising factors. Human engineering is at least as imperative as the handling of levels and transits. Costs of planning farms are said to run too high at times. The writing of farm agreements may take too long. The educational program has been known to lag or to bog down. Here and there, farmers seem to expect to be supplied field labor at Government expense. Heavy pieces of equipment—fresnos, terracing plows, ditchers—are not everywhere at hand. Impatience is a tendency: failure to comprehend the long-term benefits, unwillingness to wait for cumulative results. We might as well acknowledge some of the valid doubts and obstacles and criticisms and then proceed to some running notes reflective of present progress.

the arkansas testing grounds

SCENE of much spring activity was Arkansas. Ten of the districts had been going just about a year. Three others, approved, were ready to start. More than a million acres had already seen the completion of conservation surveys, and 1,422 farms had been planned by the Soil Conservation Service.

Districts run small in Arkansas. Tiniest of all—and among the first to organize—is Magazine, commanded by a mountain of that name, in Logan County.

Magazine is characterized by abrupt, knife-like

ridges which roughly parallel each other from southwest to northeast. These ridges create unusual water-disposal problems for farmers who till the intervening valleys. Reveille Creek, draining the principal watershed, heads in a high, billowing country now being controlled by the Magazine Mountain Resettlement Administration project—one of the largest projects of its kind in the South. The stream, as a usual thing, runs placidly between the sharp valley walls. Dogwood blooms along the way. And the native vegetation is of a variety to delight an artist and attract the interest of a botanist. Of trees, there are half a dozen kinds of oak, an abundance of short-

ARKANSAS



DISTRICTS APPROVED
NOT OPERATING

OPERATING DISTRICTS

- 101 Green County-Crowleys Ridge
- 102 Lower East Saline
- 103 Mine Creek
- 104 East Central
- 105 Magazine
- 106 Poteau River
- 107 Tri River
- 108 Illinois Bayou
- 109 Crooked Creek
- 110 Central Valleys
- 111 South Crowleys Ridge
- 112 Terre Rouge-Badcau

SOIL CONSERVATION
C.C.C. CAMPS

- 1 Berryville
- 2 Pocahontas
- 3 Charlotte
- 4 Jonesboro
- 5 Forest City
- 6 Manticello
- 8 Hope
- 9 Shiloh
- 10 Damascus
- 11 Heber
- 12 Jacksonville
- 19 Eros

- 1 Kings River Osage
- 2 Moorefield
- 3 Craighead Poinsett
- 4 Fourche-Petit Jean

SOIL CONSERVATION PROJECTS

- 1 East Cadron Creek
- 2 Crowleys Ridge
- 3 Crooked Creek
- 4 Manticello Ridge
- 5 Badcau Creek
- 6 Poteau Valley
- 7 Osage Creek

leaf pine. There are ash, sycamore, gum, elm, sassafras, persimmon, walnut, hickory. And of shrubs, the colorful sumac, French mulberry, buckbush, huckleberry, blackberry, buttonbush, wild rose, redbud, and wild plum. Grasses, too, in some array—including blue-joint turkey foot, Indian, broomsedge, nimblewill, switch, three-flower melic, smooth crab, purple top, little bluestem, small cane, yellow bristle, Dallis, and Bermuda. Yes, Bermuda, concerning which more will be said later.

But here as elsewhere, the plow, straight furrows, row crops, haphazard farming have nullified the natural advantages. Woods and meadows and pastures have known the horror of the match. The axe has cut too wide a swath. Pastures have been asked to feed too many cattle, bear up under too many hooves. Under such circumstances, accelerated by a rainfall that is high and a soil whose water-holding capacity is low, sheet washing has ensued and gullies are numerous. The first signs of economic dry rot were already beginning to appear when the district began its work. State Senator Charles X. Williams, stalwart conservationist, stated at a farmers' meeting recently that he had not seen a new wagon on the streets in 10 years.

To attempt to check the damage and to ensure the future of the valleys called for more than a hop-skip expedient. One farm, it was felt, might terrace and strip crop and revamp on a grand scale, and still not materially alter the general picture. Soils would keep on losing productiveness, minor floods would recur at the usual intervals, stock would get thinner and scragglier, farm buildings would go unpainted, population would gradually slough off, and taxes would become harder to collect. Moreover, the one farm that did its work with an eye to both present and future might find itself handicapped by the lack of conservation measures on some neighboring farm. The problems were not of a single-farm stature—they reached out over the watershed and the trade territory of the town of Booneville.

The proposed district idea looked big enough and feasible enough to merit a trial. From talking with numbers of farmers themselves, and also with local business men, I received the definite impression that sentiment for a soil conservation district sprang spontaneously from the so-called "dirt" farmers themselves. The law which opened the way was passed in March 1937 and did not become effective until the following June. But as early as July came a hearing, in October a referendum and in November the granting of a charter. A district work plan was evolved by the

district supervisors with the help of the State Extension Service, the Soil Conservation Service, and the State Soil Conservation Committee. A memorandum of understanding for active Soil Conservation Service assistance was approved in February 1938 and by March 1 the district began its practical functioning.

The nearest C. C. C. camp was 61 miles from the district. There was little heavy farm machinery in the community. But there came 135 applications for technical services. Conservation surveys were soon completed on 270 farms. Ninety of them came under agreement, and 90 percent of these swung promptly into the program. They used manpower and mulepower. Sweaty, homely manpower and mulepower. The work was aided by technicians, a steady educational drumfire, and the momentum of an aroused community wakefulness. Broad-based, modified Nichols terraces, pasture furrows, diversion ditches were installed. On 68 farms, 652 acres went out of cultivation. On these farms 4,000 acres were added to pastures, to meadows, to woodlands within the first year.

Costs of technical planning? A check-up on nine farms showed an outlay of but 9.4 cents per acre on 4,900 acres for this phase of the work. An outlay which the farmer himself did not pay and which constituted a permanent district investment.

E. L. Mikles, one of the district supervisors, now sees a future in the land. Ten-foot gullies were ripping through his place a year ago. Now they have been sloped and matted with Bermuda grass. I couldn't see a sign of them as I walked across the fields. Diversion terraces have been constructed to handle the heavy discharges of water from a large drainage area. One soggy spot of ground kept out the Mikles plow until too late in the season for planting. Mikles was confronted with the prospective loss of \$200 in A. A. A. payments. He carried his problem to his county agent, who showed him how he could make up the amount by building water-disposal structures and instituting other conservation measures of permanent character. His experience typifies the cooperation between agencies in the Magazine district.

The Rotary Club lunched, heard a young fellow tell how vocational agriculture courses are helping to spread the doctrine of better land use and better living. Afterward, a newspaper editor, a wholesaler, a banker, and a farmer-cooperator—members of a business men's subcommittee on district activities—met with me in a nearby courthouse. Someone pulled out a scrapbook of local press clippings telling the day-by-day story of district organization and accomplishments.



Another recounted the yeomen services of the editor and his wife, in preparing town and country for the new program. The nearest soil conservation demonstration project, it seems, is at Waldron, 31 miles away. And the curved farming, slowed waters and climbing yields at Waldron constituted the show window which really sold the idea of a district to the farmers of Magazine. As far back as 1936 Editor Max Hampton and Mrs. Hampton did a little voluntary promotional work, conceived a free tour to the show window. Going 50-50 with the Booneville Chamber of Commerce, they personally paid half the expenses of sending over six bus loads of visitors for a look at the new methods. The Waldron project has continued ever since as the working model for the district.

John Williams, banker: "General planning in this community is going to bring us more cotton on fewer acres. Grass and conservation of the soil will lead to a better class of livestock. And the district will encourage our farmers to do more grain feeding . . . Now, if a farmer comes in for a loan of \$100, our bank may ask him to borrow enough more to buy some needed dairy cows."

W. L. Fulmer, merchant: "Magazine district farmers measure their costs not in dollars but in time. Ledgers are balanced in terms of man-hours and mule-hours, for the farmers do the job themselves. . . . In the past we have had various high-pressure, ill-advised rural movements—strawberry booms, bean campaigns, highbred Jersey cow ventures—which have failed because we lacked canneries or stable markets or were otherwise unready. The district program, on the other hand, appeals to us as being broad based, long term, sound. It is an all-farmer program, with nothing furnished except the technical supervision. We can afford to wait a few years to enjoy its full benefits."

Hampton, the newspaper man: "What a setting for a conservation district! Why, the Bermuda grows so lush that it topples over at the top."

J. Alton Daniel, district conservationist: "The supervisors make no direct effort to encourage applications. They feel that farmers who solicit assistance as a result of work they have observed will be more determined in their efforts. We always have applications on file."

MINE Creek soil conservation district led the way not only in Arkansas but in the United States. The first hearing and the first referendum were held at Nashville. And the farm of U. J. Glasgow—under agreement No. 1—led the way in the district.

Here I saw progress average and representative of the headway that is being made under the new mode of farming. Glasgow built 1.3 miles of terraces this year, using only three small mules, a turning plow and a home-made drag. And he used a cover crop of rye and vetch on 16 acres. Much of his land was stripped with lespedeza in a rotation that included cotton-vetch-corn with a cover crop of vetch after the cotton.

Mine Creek—like most of the Arkansas districts—is small. It lies entirely within the bounds of Howard County. It is of but 88,500 acres, embraces Mineral Springs, Brewer, Nashville, Dillard, County Line, and parts of Buck Range townships. It is undulating to gently rolling, its elevation 400 to 600 feet. Rainfall is fairly well distributed but there are periods of hot, dry weather when crops on eroded, unprotected fields are sure to suffer. Its soils pigeonhole roughly as non-calcareous upland, old alluvial, and first bottom soils which are subject to overflows. There are shortleaf and loblolly pines, a few hardwoods, sweet gums and willows. In the forest openings are broomsedge, Indian grass, and carpet grass.

The main drive of the district is toward permanent cover, exclusion of livestock from woods, substitution of erosion-resisting crops for clean tilled on highly erodible acreage, rotation, vetch, rye and oats for winter cover and soil improvement, strip cropping, Bermuda grass waterways, liming and fertilizing, pasture management, woodland development, wildlife conservation, and the utilization of crop residues. Mechanical control extends to contour cultivation, terracing, contour furrowing or ridging, gully structures, and the protection of roads.

Glenn F. Wallace, chairman of the board of supervisors, is manager of one of the vast peach orchards that dot the district's slopes. We stopped to admire a

young bull that Wallace is getting ready to enter in a show ring, and to talk pasture developments. But his main concern was to show me the district's system of semicontour orchard planting in which allowance is made for strip cropping and terracing. About 300 acres have been planted in the Mine Creek district in accordance with this plan. One big orchardist now says that never again will he plant any other way. He loses fewer trees than before. The plan, which permits planting straight rows in one direction, can best be understood by reference to accompanying sketches.

Mr. Wallace has solid seeded the more erodible areas of his old square-planted orchards to lespedeza, a crop that does well on the orchard lands of Mine Creek district. He finds that he can maintain production without clean cultivation by fertilization, pruning, and proper management of cover vegetation.

District technicians hold that it is essential for erosion control and moisture conservation to plant an orchard on the contour, just like any other clean-tilled row crop. Most orchardists used the old block design so that they might cultivate in both directions to control weeds and insects. Using dry sprays, or even wet sprays, they would move their spray machines this way or that to conform to shifts of the wind. Cultivating in one direction only, they found it difficult to reach strips of weeds and grass between the trees. The new system of placing trees and terraces gives the advantage of straight rows one way—plus contour tillage, plus contour strips, plus terraces. Chief drawbacks are a slight sacrifice in number of trees, and the fact that the average farmer can't do the job without the help of an expert.

Fast approaching completion of its plan is the 180-acre farm of Joe Whitmore, 7 miles northwest of Nashville. Once creased by gullies—the worst a quarter of a mile long and 10 feet deep—this property today boasts one of the finest terrace systems and some of the greenest meadows and pastures in the whole countryside. The meadows and the pastures benefit from the water dispersed from 6 miles of broad-base terraces which follow a serpentine course around the rocky slopes. Some of these terraces are 3,000 feet in length. The structures—lined out by technicians of the Soil Conservation Service—are the work of men and teams. In making them, Whitmore relied mostly on a plow with a long wing, which is a common property of the district. There's not a gully on the place today; they have all been filled in, terraced across, sown to lespedeza.

NOTE.—The author is the editor of *SOIL CONSERVATION*.

FIVE farmers sit at a table. Most of them have known each other for years. They have had to cope with identically the same droughts, late frosts, tight money, gully washers. They believe in the community, in the good earth. Long acquaintance has engendered mutual respect and confidence. These five are the elected governing body—the district supervisors—of this typically small Arkansas district. And because the district is small, they live within easy reach of one another, get together at frequent intervals, mull over the details of operations, exchange notes and suggestions.

Glenn Wallace tells the board about an experience of the past week. He had been disturbed by considerable losses of peach trees from a mysterious malady that attacked them "on the best farms, in the best orchards, under the best management." So he wired Undersecretary Wilson—using, he stressed, his title of chairman of the supervisors. The very next day two pathologists from the Bureau of Plant Industry were down inspecting the trees, reporting their death as a result of freakish weather conditions. "There's a possibility," said Wallace with satisfaction, "that we can forestall further losses of the kind by better control of moisture."

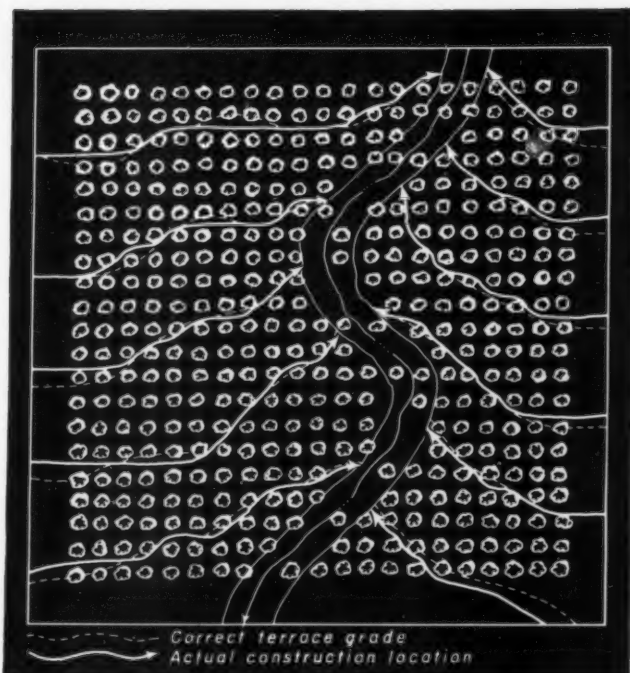
And now to the business at hand. Additional territory is petitioning for admittance to the district. A healthy sign, but the supervisors are inclined to proceed slowly with expansion. It is agreed to postpone a decision, and to exclude from consideration a large block of heavily timbered "flat woods" country which, it is felt, "would require mapping and would not greatly benefit under the district program."

Someone reports the whereabouts of district-owned equipment, outlines the responsibilities of farmers making use of it. Another states that 158 applications have been filed, 71 agreements signed, and adds "If the time ever comes when applications slow up, we intend to hold more educational meetings. As it is, neighbors visit the farms where work is now being done; these farms are the district's best advertisement."

In Howard County there is only the one plan, the one program, the one theme: Better land use. Gathered within the district is every local resource of technique, financing, and approach. One supervisor after another traced relationships, showed me how this agency and that fits into the whole, merges and blends its activities to achieve results.

"Each district cooperator was given his soil building allowance by the county A. A. A. representative," noted one. "In consideration of this, a calendar of operations was set up to absorb the full allotment for carrying out the conservation plan on his farm."

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This is the system of terraces that must be used on orchards that are set out in square blocks. The dash line shows the correct terrace grade and interval. The heavy solid line shows where the terraces must actually be located not to destroy any trees, which necessitates many small cuts and fills. Trees in the meadow waterway area will be left, but not replaced as they die.

About 300 acres have been planted in Mine Creek district according to this plan. The strips are located on the correct terrace interval and given terrace grade. Terraces can be built when trees are planted or at any time thereafter. With this system, there are straight rows in one direction. To take advantage of prevailing winds in spraying or dusting, travel may be done in the same general direction by proceeding along straight rows to ridge line or depression, and there transferring to contour rows or vice versa.



Pictures on Opposite Page

1. When he was an enrollee in a Soil Conservation Service C. C. C. Camp, C. W. Billings learned to apply conservation practices on the farms of others. Now he is a cooperator with the Magazine conservation district, installing conservation measures on his own farm 2 miles east of Booneville. Here he is constructing the dam for his stock tank.
2. Roy Milum is plowing under peas in a strip cropped field to add organic matter and plant food to the soil. Milum is a cooperator with the Crooked Creek district near Harrison.
3. A safe waterway in the making. The terrace outlet is being constructed with a freso on the C. A. Barlow farm 2 miles west of Booneville, in the Magazine district.
4. Another view on the Barlow farm. Bermuda grass sod to form a soil-binding mat in the terrace outlet is being placed by the cooperator.
5. "As you measure to your neighbor, he will measure back to you," is a statement finding expression in Arkansas districts. E. C. Bowden, Booneville, and a neighbor pool their teams and labor resources to construct contour ridges on Bowden's pasture, 1 hour after he had signed a cooperative agreement with the district supervisors.
6. A virgin stand of yellow pine near Wilmar, 7 miles west of Monticello. District cooperators are planting new forests and learning to care for the old. This timber is in Lower East Saline district.
7. U. J. Glasgow, cooperator with the Mine Creek district near Nashville, goes into the field to begin the task of converting this eroding gully into a vegetation-protected waterway. The waterway will be sodded with Bermuda grass and overseeded with lespedeza after reshaping has been completed. It will be fenced in with pasture to be grazed and will serve as an outlet for water from a 25-acre strip-cropped and terraced field adjoining.
8. Contour cultivation and strip crops of winter oats control erosion on the N. D. Smith farm 8 miles west of Nashville. Smith is a Mine Creek district cooperator.
9. Strips of close-growing, fibrous-rooted crops make clean-tilled cultivation safer from erosion. Strips of rye and vetch on the contour filter out soil which is moved by water from the contoured cotton on the W. B. Piles farm at Waldron, in the Poteau River district.
10. Not only do strip crops help to keep the soil in place, but they also pay their way in fields of grain needed on many farms. Here oat strips are being cut on the O. L. Soloman farm in the Poteau Valley near Waldron.
11. Harvesting an alfalfa crop near Harrison, on the farm of K. Morris.
12. J. T. Cray, farmer near Harrison, prepares to spread lime over his fields as an aid to obtaining better vegetative growth on eroded land retired to pasture. Lime is procured from quarries on cooperators' farms. Crooked Creek district supervisors and the county agent have acquired a lime crusher which is operated mostly by farmers.
13. Making hay while the sun shines and keeping the farm at home when it rains is the dual purpose of this native meadow of lespedeza, little bluestem, sage grass and Indian grass. It serves as a source of hay and as an outlet for the terraces seen in the background. This farm belongs to W. D. Strain, Rosebud, in the Central Valleys district.
14. Land grown poor with fertility-sapping erosion and clean-tilled cropping needs to be fertilized and seeded in permanent pasture. Here the retired land on the J. E. Snyder farm, Forrest City, is being prepared for sodding. The practice of preparing a good bed for the sod is being followed in the Greene County-Crowley Ridge district in northeast Arkansas.
15. John Jenkins and a helper are shown constructing contour pasture ridges on the Jenkins farm 9 miles east of Booneville, in the Magazine district. These ridges will hold rainfall on the land where it falls, storing water to aid grass growth and help in flood control.
16. Sodding the ridges shown in picture 15.
17. Seventeen eggs in a quail nest on the O. L. Parkinson farm, 1 mile south of Harrison. The nest is in a black-locust plantation protected from fire and grazing. Wildlife management is a part of the Arkansas district program. Farmers take an interest in this phase of conservation equal to that accorded other phases of the program.
18. Cover and green manure crops play an important part. Here a cover crop of vetch and small grain is being plowed under on the farm of O. L. Parkinson, Harrison, in the Crooked Creek district.
19. The second generation watches the construction of contour ridges in a pasture near Bentonville.
20. E. C. Bowden and his neighbor "swap" labor and teams to get some sodding done.

ARKANSAS FARMERS AT WORK IN THE DISTRICTS



Flashes from the district scene: These varied pictures are visual evidences of the progress being made under the united program. Farmers themselves are doing the job, but they are making use of the whole range of facilities and techniques derivable from cooperating agencies. The idea is to safeguard the soils and utilize them at full efficiency.

(The mosaic is explained on the opposite page.)

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Another explained that Farm Security clients are among those with agreements. They know precisely what to expect. Cotton, feed, livestock, canned goods—the specified production qualifies for the loan.

The Soil Conservation Service technicians, the county supervisor of the Farm Security Administration, and the clients jointly develop a farm plan. The Farm Security Administration representative becomes the contact man for the district supervisors, with such clients. He carries with him a copy of the soil conservation plan of each client's farm, is responsible to the supervisors for putting it into effect, looks to the Soil Conservation Service for aid in establishing erosion-control treatments.

The county agent and the home demonstration agent and the State Forest Service talk and think in terms of the district. Here, as in Magazine, average, self-reliant farmers make the decisions, adjust theory to practice, keep costs low by making use of the facilities at their elbows.

Said one good farmer: "We're not committed to an arbitrary policy. We regard the work thus far as exploratory, growing out of demonstration. We'll keep the district flexible in operation, introducing changes as we acquire experience."

recovery in crooked creek

GO WITH ME now to the Crooked Creek soil conservation district. Hewn out of parts of three counties, it lies high up in the Ozark country of northern Arkansas. We travel winding, tilted roads; ford swift-running, rock-bedded fingerling streams. Springs gush cold and clear out of the breasts of the mountains, inviting us to drink our fill. The woods are a plaid of many colors. The turns and twists of the trail are full of surprises. Broad sweeps of valley come suddenly to view, silver threaded with the fast-flowing creeks of the region—Crooked, Clear, Hampton, Greasy, Mill. Mountain waters which too often change to swirling brown, and break their banks to go on drunken orgies of destruction. The valleys are velvets green and bronze—but here and there vandal forces of erosion lately have torn at the tapestry, ripped the valleys end to end leaving them wounded and miserable. Gullies and the less conspicuous sheet erosion have made serious inroads on the beauty and productiveness of the land. And the same defective land use that has led to soil losses has also induced an unbalanced and abrasive farm economy.

The losses came slowly, and the recovery promises to be gradual. A new order of agriculture under the district plan can hardly classify as revolutionary because it comes as a natural, logical transition. M. A. Mears, tramping the furrows on a sloping field of his farm near Flippen, dramatizes the district idea. He carries two sacks instead of one, as he goes about his planting. Those two sacks symbolize a practice which a few years ago would have constituted rank agricultural heresy. He drops a few kernels of corn, and in the same furrow a few sprigs of Bermuda grass. It's the latest thing out here in the Crooked Creek vicinity. "The corn will pay for the work of establishing the sod," Mears explains. "And cultivation of the Bermuda encourages its growth. I got the idea from the Crooked Creek demonstration project, and the Soil Conservation Service technicians tell me it ought to work out well in developing my pasture program."

Nearby is J. H. Briggs, tenant. Under his new farm plan, he has recently planted 4,000 black locust trees furnished by the district. They are behind a new fence on a hilltop, and Briggs looks forward not only to better protection of the soil but to an increase in wildlife. He also has put out 30 acres in lespedeza.

Member of the Marion County Agricultural Program Committee is E. C. Walker, vocational agricultural teacher. Under his leadership 25 farm boys of high-school ages, are drilling in classes 5 days a week, sometimes also at night, on farm enterprises (small grains and forage crops), farm management, and farm repair work (fences and implements and so on). Each youngster carries on a supervised project program which divides into livestock, feed for livestock, and farm improvements (in which maintenance is particularly stressed). Wallace has 5 communities, finds that the county agricultural program short-cuts the educational preliminaries and reduces the number of meetings needed. He tells of interlocking relationships—of cooperating forces—schools, homes, Federal agencies, business groups—working with the farmer to weave a sound warp and woof for the district's land-use scheme.

G. E. Tanner, county agent, rides with us on a tour of the area; tells of the "absolute unity" of State Forestry Commission, Farm Security Administration, Agricultural Adjustment Administration, Soil Conservation Service, county school examiners, Extension Service, Farm Bureau, school superintendents, county judges, in bringing to a common focus the problems that beset the land and the people. He

describes the Agricultural Workers Club which meets at Yellville, lends vigor to the field attack.

Paralleling the ribboned highway at one point is the remnant of an old fence, the posts half buried by soil washed from higher land—unmistakable evidence of slipshod farming in the past. Superseding it are new posts, new wires—and in the fields beyond, a new mode of farming: symbol of better land use under the district idea.

Virgil Ott, farmer of Yellville, shows us the new mosaic being patterned on his sandy izzard soils—contoured fields with corn on the levels, strips of lespedeza sericea and oats, contour ridging on the exact level blocked every 50 feet to hold the water, broad-base terraces emptying into a recently scooped stock pond. Ott refers to the great, gaping, sawtooth gullies that have eaten at these very soils, says "Somebody's got to do something or we'll all have to move out."

J. B. Milligan, farmer of Bruno, has been under the district plan since January. He has 17 head of cattle, is building toward 50. He is working out his salvation by curved cultivation, Bermuda, lespedeza sericea, Korean lespedeza, hop—following the lines of a plan which he will press to early completion. He is proud of a fine spring which flows down to Greasy Creek, furnishing a pure, sure supply of water to home and livestock. A trench silo is a valued recent innovation. "For years I have been a row farmer, but I want to get away from the mistakes of the past," he told me. "I like the district idea. It looks to me like our only hope."

Angling up steeply at our right is a 17-acre hillside pasture—one of the grandest pastures in the entire northern part of the State. It is a lush mixture of hop, bluegrass, Bermuda, and Korean lespedeza. The grade is so sharp that farmer, team, and implements actually tumbled downhill twice in the process of grooving contour furrows recently.

O. B. Pyle is owner of this farm and a leader in the Bruno community. He is district supervisor, a member of the executive committee of the State farm bureau, president of the local farm bureau. He regularly carries 70 head of cattle, knows the art of pasture management, watches the capacity of his grasslands, has a clear philosophy as to farm planning and district development. He referred to the expected location of a CCC-SCS camp within the district, thought it would prove useful in its usual capacity. "There are a few farmers, however, who have the impression that the camp will take the place of the district, instead of simply filling a supplementary role," Pyle observed. "They're waiting for the camp to



Bermuda grass and corn are agreeable bedfellows on many Arkansas farms. The corn in this picture had been cultivated four times with small shovel plows and "laid by" with a small turning plow. A yield better than the average resulted.

move in before they get down to work. As a supervisor, I am going to see that the camp gives help to those who help themselves; the farmers who are already actively cooperating will get the first assistance. There's a big job to be done here in the Crooked Creek district. We can't hope to get it done unless we all pull together."

We drive down the main street of Bruno—a thoroughfare described as one which "never goes dry" because it is actually a shallow, gravel-bottomed stream fed by a big spring; stop to chat with J. B. Ewart, who has taught vocational agriculture in Bruno for 17 years. He is one of the strong cooperators who are "pulling together" for the success of the district. He personifies the busy teamwork that is seeking, through the district, to improve upon a farming regime which is accustomed to 16-cent butterfat, 12-cent eggs, 5-cent hogs, 12-cent broilers, and 6-cent beef; which hasn't had a corn crop in 3 years; where 12 bushels is a good wheat yield, and where 20 bushels is about the top production for oats. Better oats were

introduced on Crooked Creek farms last fall, however—and soil conservation has come to stay.

Of the many significant shifts in trend which soil conservation districts are bringing to Arkansas, none is more amazing than the development of pastures and meadows. Bermuda grass—once regarded as the farmer's pest—is now the farmer's friend. Its uses are many, and its popularity is spreading wherever there are gullies to be mended, waterways to be established, grazing to be supplied, restless soils to be blanketed against loss. In certain quarters there is a feeling that the pastures could easily get ahead of the livestock. But in Harrison, Boone County, the bank, railroad, public utility, and chamber of commerce recently set up a revolving fund of \$1,000 with which to purchase purebred bulls, cows, and heifers as a nucleus for the expanding livestock industry. At a meeting of the Agricultural Workers Club, O. L. McMurray, county agent, told of bringing in 35 animals, mostly Jerseys, which were resold on convenient terms to farmers of the community.

Kaleidoscopic notes from the Crooked Creek scene:

John Pearson, Everton farmer, writes to the district conservationist: "She holds water like a jug, so the contours are the dip."

T. C. Morrow, Yellville farmer: "My land is better than it was when I changed my method. Land on which rows are still going up and down hill is still 'going down hill' in production. Our land was not put here to wash away. If we do not take care of it, it will soon have to be retired and nature will have a real job putting something back which we destroyed. My experience has taught me that check-plowing corn is not necessary to control weeds and grass. Corn planted on the contour slightly below the level in a furrow can be cleaned without plowing both ways. Fewer roots will be disturbed by plowing only one way. . . . I'm sure I get one-third more yield per acre by contour cultivation."

Walter F. Wood, farmer of Flippen: "If something is not done in this country, we will not have any land left to cultivate 25 years from now. Pastures, meadows, legumes, and livestock will save it."

An acre of land on the K. Morris farm, near Harrison, was once an eroded drainage ditch. Last year it produced 53 bales of timothy and alfalfa worth \$25. "The adoption of a soil-conservation program on my farm has made it possible for me to increase my livestock from 6 to 40 head and supply all the feed required to keep them." Mr. Morris is a cooperator of 3 years with the soil conservation demonstration project which prepared the way for the Crooked Creek district.

six brothers in central valleys

NOW, a swing through Central Valleys, largest of the Arkansas districts. Its arms arch out to include parts of five counties—Van Buren, Conway, Faulkner, Cleburne, and Pope. Here, repatterning 22,000 acres, we find 189 farmers seeking through better land use to control erosion, to keep more of the moisture where it falls, to plan their way to profits. They've made a beginning by taking 1,735 acres out of cultivation, adding 4,550 acres to permanent pasture and 514 acres to permanent hay meadows. Already they have banded 1,789 cultivated acres with strips of lespedeza and other soil-improving, soil-protecting crops. Forty acres have been planted for wildlife, and 3,273 once-idle acres are idle no longer. The district is receiving assistance from Soil Conservation Service technicians and from enrollees of Soil Conservation Service C. C. C. camps at Damascus, Heber Springs, Jacksonville, and Shiloh. As in other districts, the program is both a watershed and a community enterprise, backed by the combined forces of cooperation.

These farmers are protecting cultivated land from erosion by contour cultivation, strip crops, terraces, and crop rotations. Pastures are being improved by sodding alternate contour 30-foot strips with Bermuda grass; by overseeding with lespedezas and clovers; by contour furrows and ridges for retention of moisture; by fertilizing, and by removing sprouts and brush. Gullies are being plowed in and sodded. Woodlands are being protected from fire and grazing.

Six brothers owning 1,100 acres in the Pleasant Valley community north of Conway are among the farmers aggressive in advancing the district. This spring they pooled their team power and equipment, set a terracing record when they began installing conservation practices. In 1 hour and 20 minutes they completed 650 feet of terrace on Sam Wilcox's 240-acre farm, using 12 mules, 4 to pull the plow and 8 to pull a Martin ditcher. The terrace was of the channel type, 18 feet wide with an 18-inch channel. The carrying capacity will take care of any kind of rain that falls in this country.

These brothers—Sam, R. W., Morris E., H. B., Fred, and Ed Wilcox—all were among the early applicants for assistance from the district. They are using a wide variety of mechanical and vegetative controls. They used winter cover crops of vetch, which they plowed under this spring as green manure.



the georgia laboratory

WHERE flows the Savannah River, Eli Whitney in 1793 invented the cotton gin.

But Whitney gave to his adopted Georgia—and to the world—more than a new machine: He gave Georgia and the South a prosperity of pillared mansions, of surging industry, of busy seaports and singing rails; a picturesque and colorful symphony with Negro spirituals rolling across more and more whited fields.

But the agriculture born of the cotton gin flowered on a narrow stem. Always and ever lurked within the fluffy bolls a hidden danger. Cotton's quiet tread wore a hard path down through the years. Progressive Georgians sensed the hazards of single-cropping as early as 1810. In that year a handful of farmers incorporated the Agricultural Society of Georgia "to excite among their fellow citizens a desire of making experiments for the renovation of exhausted lands." And for 130 years Georgians wrestled with the problems of soil waste and a distorted agriculture. They joined rural movements, led cooperative attacks, pioneered in research and demonstration.

Not surprising, therefore, is Georgia's unified response to the opportunity presented by the district idea. Or that she is tackling the district program on a large scale. Districts run as large in Georgia as they do small in Arkansas. Whereas Arkansas thinks in terms of small watersheds and small communities, Georgia builds on large watersheds and county dimensions. The varied attacks of the two States illustrate the flexibility of the district plan.

Already—a bare 2 years after passage of the enabling act by the legislature—Georgia districts are crowding the map. To the districts the Soil Conservation Service alone has furnished an even dozen tractors, 34 ter-

racers, 15 drag pans—each item of equipment scheduled for weeks in advance, kept in top working condition, an incentive to cooperative effort. This Service, too, has supplied 24,000 pounds of lespedeza sericea seed, 855,000 kudzu seedlings, nearly 600,000 trees—direct contributions to the stabilization and improvement of soils. I found more than 135,000 acres under agreement, 6,000 acres of pasture contoured, more than 1,000 of the greenest meadow strips I ever have seen. Vast acreages of pasture lands have been seeded, fertilized. Ten thousand acres of new forest are pinning down farm corners that cannot so profitably be used any other way.

These and numerous other accomplishments come of the right kind of teamwork, and plenty of it. Framing and inspiring the land-use program in each county is a technical advisory committee—a meeting ground for all agencies concerned, with the county agent as presiding officer.

Teaming with the technicians is a farmers' advisory committee picked by geographical location and by crops; it studies survey, map, viewpoint of the technical group, offers recommendations to the soil conservation district ranging from retirement of acreage and discouragement of community pastures to other policies close to the heart of land use and development; gives the district the needed momentum. The county plan, therefore, springs from farmers, themselves—farmers availing themselves of good technical counsel.

broad river innovations

I WANTED to see how the Broad River district was working out its destiny. Eight counties cluster within its bounds—Banks, Stephens, Franklin, Hart, Madison, Elbert, Oglethorpe, and Wilkes. Substituting here for the close intensity of operations which I came to look for in Arkansas was a wide spotting of farmer activity with a decided trend toward adoption of practices—so-called "spread of practices"—in between.

For example, I learned of a farmer in Hart County—M. M. Norman, an honored "master farmer"—impatient to get under way, who wrote an excellent cooperative agreement himself, obtained its approval, and put his plan into effect. On his farm, I saw crimson clover meadow strips where gullies used to be. Not one farmer in many would be capable of doing as much or would essay a task usually calling for a specialist—but the path was open for the exceptional individual.

An innovation now in the test stage in the Broad River, Piedmont, Coosa River, and middle western



Dr. H. H. Bennett, Chief of the Soil Conservation Service, finds crimson clover does well on Georgia's famous "red hills." He examines a handful of this soil-building legume during a tour of Hart County in connection with the county's annual crimson clover festival, April 28.

Ocmulgee districts is a 4-day training course conducted by vocational agriculture teachers and Soil Conservation Service technicians.

I found the eight vocational teachers in Hart County important factors in district development. Here the Soil Conservation Service works out a program jointly with the teachers. Each teacher takes responsibility for the vegetative work on four farms—the kudzu, the crimson clover, the lespedeza, the trees, the pastures. That leaves the water disposal system to the Soil Conservation Service technician and gives him time to plan more farms than otherwise.

Active in accelerating district progress in the Franklin County work unit, Carnesville, is E. K. Davis. Davis, county agent, is an organization genius. He outlined the conservation attack, got up petitions. He called a meeting at Athens, summoned a good cooperator from each militia district—the smallest county unit—took pains to select those who had cars and could reasonably be expected to attend. These militia district representatives—there were 13, in all—incorporated, set themselves up as a county committee. Each committeeman drew up a list of 10 farms, suggesting the order in which they should be worked; the number was then pared to 3. The committeemen, supplied with the proper forms, conferred with their neighbors—their clientele—and came back with properly signed applications for service.

The county work unit thereupon obtained a tractor from the district which was on loan from the Soil Conservation Service. A committee was appointed

to look after the tractor, to assign and route it. The supervisors decided on a rate of \$3 per hour. Much time was lost, at first, trying to operate tractors efficiently; the solution was to bring in a technician of experience on the Athens demonstration project as inspector and director of terracing operations, and as instructor in the use of machines and implements—sometimes horse-drawn—throughout the district.

T. B. Thornton, Hartwell, led us knee deep through crimson clover which was at the point of bursting into bloom, said that crimson clover is one of the main reasons why Hart County today is almost deserving of the phrase "a dream come true." Two thousand acres of the Hart County work unit have been terraced. A district supervisor, this farmer avers that Broad River farmers "might"—he speaks the word tentatively—"might have gotten as much done in 20 years without the district as in 3 or 4 years with it."

Here in Hart County I was told of meetings held week after week by the Smith-Hughes teachers and representatives of F. S. A., S. C. S., A. A. A., Extension Service, R. E. A., Government lending agencies, and T. V. A. Each carried his problems to the meetings, fitted his segment to the district program as a whole.

Field after field was green in Hart County, green and safe from serious loss. Crimson clover mantled terraces and meadow strips on district farms. Crimson clover, and kudzu, and lespedeza, and Bermuda, season by season, are pinning down the soils, improving the soil resource, giving to northern Georgia an agricultural renaissance.

The talk hung around the subject of the crimson clover festival, which was soon to be held in Hart County, with music and barbecue, distinguished speakers, and visitors from miles around. In 5 years the State of Georgia has increased its plantings of crimson clover seed from 111,540 pounds to 2,837,350 pounds. This one stroke has done a great deal to change the rural panorama. Said a Hart County farmer, recounting a typical experience: "I have a small herd of dairy cows and find that it fits in mighty well when cover crops are grown. My cream check increased from \$4 per week to \$9 per week when the cows were turned in on crimson clover."

J. R. Westbrook, Ila, plants every third terrace interval in sericea. He has enough cattle to use it. His method is to seed Korean, 40 pounds per acre, in his wheat and oats. He cuts the grain, the lespedeza then comes on and reseeds itself. Westbrook is a good representative farmer; a supervisor of the Broad River district. He showed me where an old



ditch had been filled in and seeded with sericea. He pointed with satisfaction to a field of specially bred barley, a grain which he is using to replace corn on steep slopes. "Wildlife men," said he, "are having difficulty finding 'high class' gullies for their work on treated farms."

Lespedeza is also being planted in crimson clover on the Westbrook farm. Twenty acres are going into kudzu. Kudzu, too, is doing nicely for meadow strips on this farm. Loblolly pines are being set out on galled slopes. Oats and vetch are combined, mowed, fed. A road bank, once high as a man's head, has now been leveled, sown to lespedeza sericea; every bit of the land is being put to use. There were 40 white-face cattle 3 years ago; today, the same amount of pasture—but better—supports 85. There is more manure available, with which to increase the yields of crops.

FRANKLIN County is, agriculturally speaking, not only outstanding in the Broad River district but in the entire southeastern United States. The abrasive effect of erosion is clearly in evidence but the gullies are being filled, road banks are being sloped, sheet washing being arrested, and soils gradually being built back to productiveness. The policy that is being applied to such good effect in Franklin County is one which is being more and more generally followed throughout the district. Briefly, it outlines as follows:

Kudzu is planted in strips on abrupt slopes on cultivated fields. The next steepest and the worst eroded fields are assigned to lespedeza sericea in strips. This practice affords enough kudzu and sericea to supply the needs of the farm for hay. These two plants are deep rooted, and are not so susceptible to damage by the dry weather that can be expected in late summer.

Oats and barley are substituted for part of the corn normally grown for work stock, calves, and chickens. In all small grain an annual lespedeza is planted for seed production, soil saving, and soil building. It is, of course, plowed under. This assures hay from drought-resisting crops, and at the same time reduces

the acreage ordinarily devoted to clean-cultivated corn. The lespedeza seed and the small grain make two crops from the land and build fertility; the grain is cut high with a combine, and only the seed is removed from the lespedeza. All straw stays on the land.

piedmont district works back

HARD TIMES were an old, and a familiar story in Greene County. The land thinned and sickened, and its keepers wavered in their faith in its adequacy. The boll weevil came and half the population dribbled away under its impact. Houses went unpainted, unrepaired, began to lean on their foundations. Serious became the question of shelter for human souls, for livestock, and for crops. Schools and churches went to ruin. A problem area became Greene County; one of the worst areas of economic decay in all the South.

But a spark of initiative yet glowed to light the flame of big endeavor. From Greene County farmers themselves came the demand for inclusion in the Piedmont soil conservation district. With the setting up of this district, Greene, Taliaferro, Hancock, Putnam, and Baldwin Counties joined to prepare the bed of a new social structure. A county board of health was created as a result of the new impulse. The board of education and the county commissioners offered assistance. The W. P. A. undertook to erect school buildings in locations indicated by the densities of population. Came, too, not only the Soil Conservation Service but the National Youth Administration and the Civilian Conservation Corps. The Smith-Hughes vocational teachers and the Extension Service agents volunteered their services. Yes, and the Farm Security Administration.

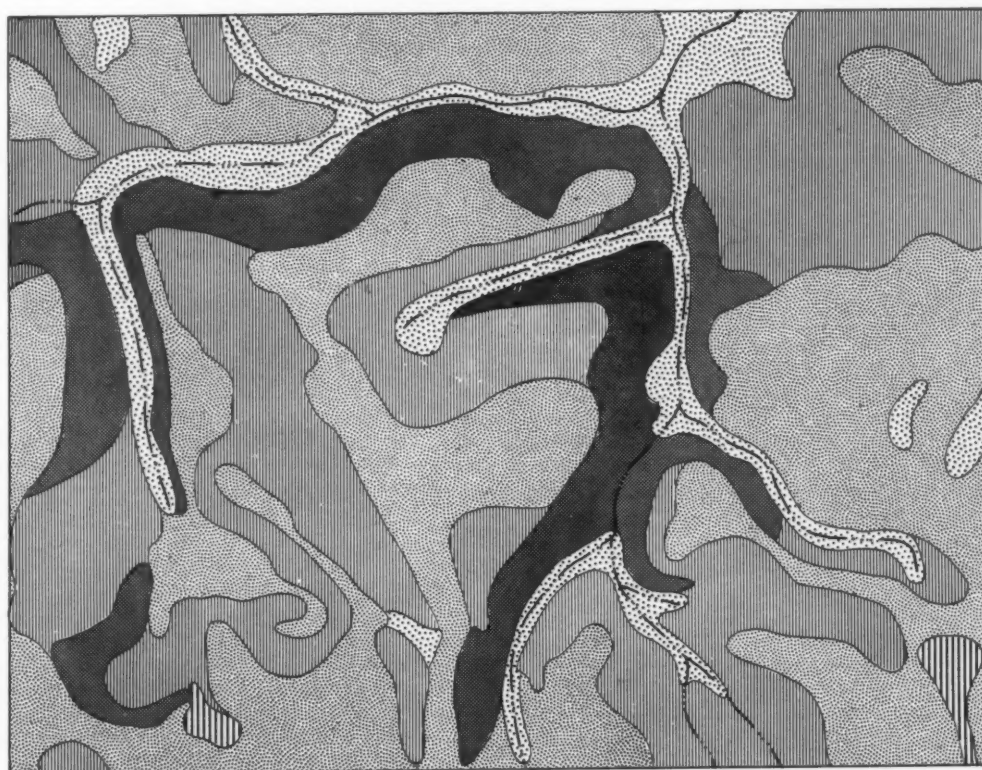
With me to Greensboro went R. L. Vansant, State director of the Farm Security Administration and Whitney Tharin, extension editor. Said Vansant: "The first farms in the district to be planned and put under agreement were under the wing of the F. S. A. They number 132."

We crossed the sleepy—always muddy—Oconee River: trunk line of erosion's freightage. Vansant

(Continued on p. 292)






Note.—Use-capability maps such as the one on the opposite page may soon be facilitating the work of writing cooperator agreements in soil conservation districts. They are readily interpreted by both farmers and technicians. Developed from conservation surveys and aerial photographs, the use-capability map brings together the available information on soils, slopes, erosion conditions and land cover. Certain practices and measures are known to be applicable to given sets of conditions and, by referring to detailed instructions accompanying each map, it is possible to determine which portions of a farm can be cultivated without hazard, which require simple protective devices, which demand the whole range of engineering and vegetative controls, which are suitable only for grass or hay, and which call for retirement to woods. First areas to be mapped according to use-capabilities are at Winona, Minn., and in Greene County, Ga. Similar maps are being developed for other sections of the country. Reproduced here in black is a segment of a much larger master map done in colors.

Piedmont Soil Conservation District
Section of Greene County, Georgia



Scale in Miles
0 1/4 1/2 3/4 1

Classes of Land According to Use Capability

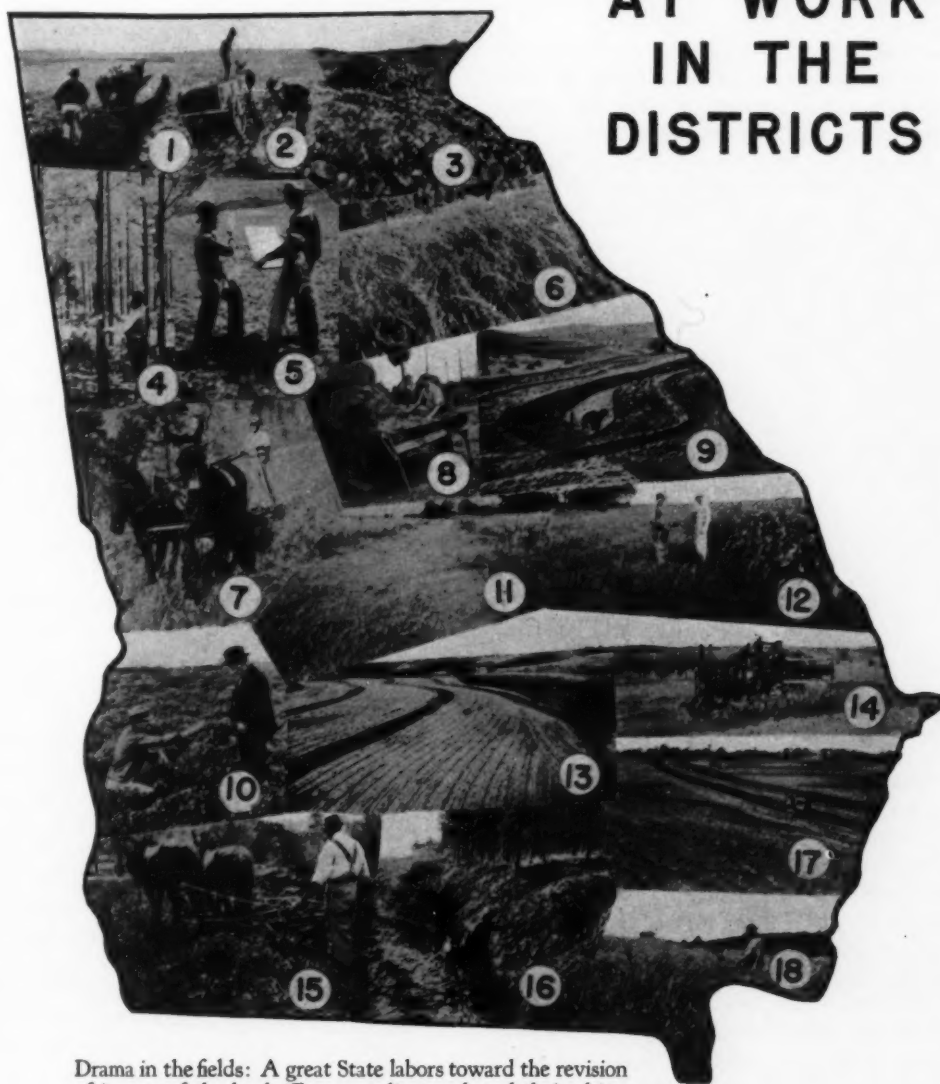
-  I Suitable for cultivation without special practices
-  II Suitable for cultivation with simple practices
-  III Suitable for cultivation with complex or intensive practices
-  IV Not suitable for continuous cultivation
-  V Not suitable for cultivation



Pictures on Opposite Page

1. Proper land preparation is the first step in getting kudzu established. Kudzu requires cultivation the first year or two.
2. Manure and superphosphate are applied as land is prepared for kudzu. Badly eroded soils usually do not contain sufficient plant food to produce an adequate cover.
3. Kudzu produces hay and forage of excellent quality, palatable and similar in nutritive value to alfalfa.
4. In the Georgia districts farmers consider their trees as a crop. In pioneer days, timber was something to be destroyed to make way for crops, but today they are vital to the farm economy as a source of fuel, fence posts, lumber, and cash income.
5. Farm planning for soil conservation replaces guesswork. It is better to know the best use for each area of land, as indicated by kind of soil, by slope, and by erosion conditions.
6. *Lespedeza sericea* provides continuous protection for severely eroded land. It also furnishes excellent cover and food for wildlife. Where harvesting is a desirable practice, good hay may be had from *lespedeza sericea*.
7. Disking old broomsedge fields stimulates growth of native wildlife plants. Improving the fertility of the soil is prerequisite to the substitution of desirable forage plants.
8. Threshing crimson clover seed by hand to expand the winter cover acreage. Farm seed plots of crimson clover are important in the soil conservation program.
9. Terraces and contour cultivation provide mechanical aids to holding soil. They also store up rainfall, allow it to soak into the ground for use in time of need.
10. Crimson clover furnishes winter protection and organic matter; holds plant food through the winter, keeps it from being leached out by winter rains.
11. Meadow outlets mean more hay, as well as safe disposal of water from terraces. A smooth surface, an even grade, and a good grass cover prevent such drainageways from becoming waste areas of gullies and marshes.
12. Close-growing crops such as millet and grain sorghum provide feed on Georgia farms. District farmers include in their program enough animals to supply home needs for fresh meat, milk, and eggs.
13. Terraces break long slopes and divert run-off water safely out of fields. Vegetation alone cannot assure complete protection where the soil is too poor to produce adequate cover and where rainfall is in excess of the capacity of the soil to absorb it.
14. Combines may be used for harvesting seed of *lespedeza sericea* and other erosion-resisting crops. Many grasses can be harvested and sown without threshing. The straw affords excellent cover for the young seedlings.
15. Austrian winter peas add organic matter and nitrogen to eroded soils. Like crimson clover, they save plant food that would be lost if the soil were left bare.
16. Mulching and seeding transform useless gullies into wildlife havens. Mulching is often the difference between failure and a success in seeding raw subsoil.
17. Vegetative outlets are replacing gullies for terrace water disposal. Such outlets require maintenance to insure the growth of a uniform cover. Properly kept up, they are assets instead of hazards.
18. Many new close-growing crops such as millet are finding favor in the land of cotton. Most of them are good as livestock feed. Since they demand less working of the soil than clean-tilled crops, the rate of destruction of organic matter is reduced.

GEORGIA FARMERS AT WORK IN THE DISTRICTS



Drama in the fields: A great State labors toward the revision of its use of the land. Farmers adjust and pool their objectives, combine their resources, take advantage of all the technical services available. They hope, through district instrumentalities, to check the wastage of soils, to improve productiveness, and to safeguard investments.

(See opposite page for detailed explanations of the pictures above.)

(Continued from p. 288)

pointed to a tenant Security farm, now banded with lespedeza, breasted with kudzu. He remarked "This was at one time one of the wealthiest agricultural counties in Georgia." Even now the area is dotted with the once grand homes of moneyed estates. Vansant held the large landowners and absentee ownership partly responsible for what ensued.

"One-third of the present population is dependent upon the Farm Security Administration," he declared. "There was no other means of obtaining credit. But our farmers were ready for a permanent remedy—they turned naturally to soil conservation and better land use proposals. We sometimes furnished the money to buy mules. We financed the payment of rents in advance, so that landlords could pay for repairs to buildings and the development of the land. We financed to a considerable extent the whole soil-conservation program here. We know that rehabilitating the land has an intrinsic bearing on rehabilitating the people."

I STOPPED at Eatonton to talk with W. F. Leverette, manager, about the unique undertaking of the Plantation Piedmont project, a land utilization enterprise of the Soil Conservation Service. The project lies partly within the Piedmont district, with which it works in close collaboration. Of the original acreage of 120,000, some 13,000 acres have been turned over to the Georgia Experiment Station, 30,000 to the United States Biological Survey, 5,000 to the Southern Forestry Experiment Station. Of the 452 families which originally dwelt here, only 116 remain—the others having been absorbed by the Farm Security Administration or having drifted away.

The Plantation Piedmont project was one of the first projects of its kind in the country. Its chief interests are fourfold: Forestry, grazing, upland game and wildlife, recreation. At the outset of its program, a survey showed that the annual income of its wards whittled to perhaps less than \$75 per family per year. The project proceeded to select areas capable of providing permanent subsistence for at least 50 families. These workers' subsistence units consist of truck patches and a few cows, the home production supplemented by W. P. A. wages for work in fire prevention, the maintenance of roads, and kindred jobs. For vast distances roundabout, there were no recreational facilities; the project has now developed two large lakes, has strung 72 miles of telephone lines, and erected five towers for fire prevention. The land is a natural habitat for quail, squirrel, coon, fox, rabbit, dove, and wild turkey, and wildlife will be given a chance to

come back. Soil conservation is the prime concern, for to its neglect in the past are attributable many of the ills that befell. The district, therefore, has a task to perform. And the Plantation Piedmont project families, with full legal status as land "occupiers" vote for district supervisors and cooperate in the safeguarding of their plots.

A LARGE fan is the farm of E. C. Duvall, 9 miles northwest of Greensboro. The handle leads to the highway and the webbing edges the murky Oconee. A property somewhat run-down but of interesting potentialities, this farm is experiencing a rapid transformation under its new owner, who is ambitious to see what correct land usage can do on his alluvial and sandy loams. Duvall is a staunch cooperator, sees his own problems in relationship to the problems of his neighbors. He showed me his hotbed, his contoured pasture, his smokehouse with immense sides of pork and a 40-pound ham; a well-planned, high-lofted barn financed by Farm Security funds, a handsome stallion. Duvall proceeds on a live-at-home, self-sufficiency basis; looks several years ahead to the time when his water-disposal system will be complete, the terraces and strip-cropping and soil-building rotations paying dividends.

Ahead are 5 busy years of installing diversion channels, of constructing and seeding Bermuda grass and kudzu meadow strips, of retiring lands to pastures developed of kudzu crowns and superphosphate and barnyard manure, of kudzu-covering gullied areas, of rearing fences for protection of grass and trees, of building brush dams, of harrowing and seeding-in lespedeza and Dallis grass and white Dutch clover, of culling and pruning for fuel supply and woodland improvement. Rotations, carefully projected through the years, will provide cotton, corn, small grains, winter cover crops, summer hay. The written agreement between district and cooperator is complete, detailed, clear, and definite; it sets forth the when, the where, the how, and the who of each operation. The district obligates itself to map the farm, to survey the terrace and contour furrow lines, to furnish instructions for the construction and treatment of terrace outlets, to stand by with agronomic and other technical advice. The owner furnishes most of the labor and materials. "The district soil conservation plan is practical for my farm," says Duvall. "And the more farms that come under the plan, the more effective it should prove to be."

THUS concludes a preview of the districts film: an odds-and-ends assortment of glimpses and impressions, of lights and shadows projected against

the earthy surfaces that are Arkansas and Georgia. The picture is of minds and men in meeting, of human relationships, and social intangibles. Mass education and intensive activity; the farmer on the one side and the technician on the other; soils' problems in the same bag with economic problems; the farmer pressing to obtain service and the district staff struggling to satisfy his need: These, too, are important to the drama of a young idea hastening to maturity. In the background range the pioneering demonstration proj-

ects of the Soil Conservation Service; in the foreground, the forces of continuing research—forces like the Southern Piedmont Experiment Station at Athens, delving into studies of the contour-balk method of growing cultivated crops. This report aspires to reveal only a slight silhouette at gray dawn—a suggestion of what is transpiring in the beginning phase of what may prove to be a different, and more pleasant, period in the history of the land and of its use.

Insects and Conservation

By F. C. Bishopp¹

Sod loosened by white grubs and lifted to show some of these insects.

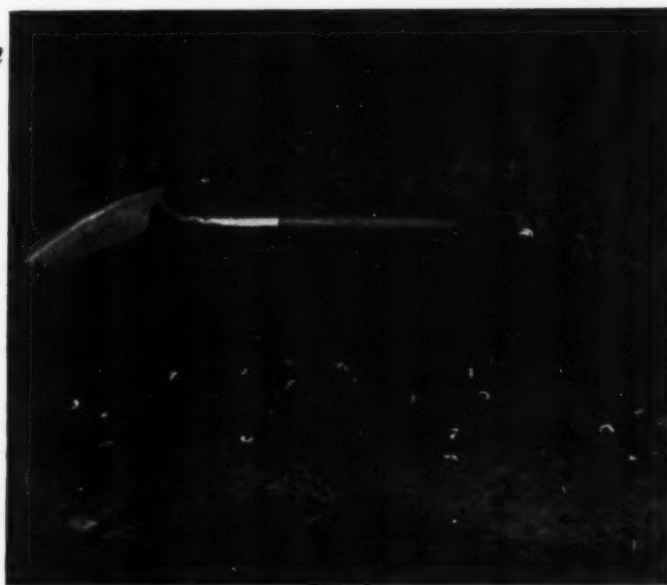
IT IS only necessary to observe a swarm of grasshoppers spreading over a field or pasture to visualize the part these devastating insects can play in stripping the land of its protective cover, and setting the stage for erosion. Moreover, these outbreaks usually occur in the semiarid West, where the retention of moisture is a vital need and where wind erosion is most likely to occur. At their worst these hordes of hoppers may denude hundreds of thousands of acres so completely that scarcely a sprig of green vegetation remains, and many of the blades and crowns of the dry grass plants are consumed. Even in years of severe drought, vegetation normally makes sufficient growth to give considerable protection to the soil surface if it is not stripped by insects or other agencies. Even during periods when grasshoppers are not present in outbreak proportions, the vegetation destroyed reaches an impressive total.

The destructive effects of grasshoppers serve only to illustrate strikingly what is being done less conspicuously by many other groups of insects. There are literally hundreds of leaf-eating species and perhaps even a larger number which suck the juices from the plants, reducing their size and vigor, or even causing them to wither and die. Other insects destroy the seeds, crowns, and roots of plants, and still others

devour the nitrogen nodules on legumes, so important in the improvement of many soils.

If we should follow our inquiry into the earth's crust, we would find it literally teeming with minute animals, many of which are insects. It has been estimated from careful examination of typical areas that the insect population runs from 2,000,000 to nearly 13,000,000 per acre. Some of these insects are truly beneficial in the aeration and formation of the soil, their work making it more pervious and thus more retentive of moisture.

Just what part insects play in the breaking down of plant tissue into leaf mold and humus and of animal matter into materials suitable for plant food has not been definitely determined, but it is by no means small. Much attention has been given to the soil-conditioning action of earthworms since this matter was forcefully presented by Darwin, but the role played by insects in this respect has been largely passed



¹ Principal entomologist in charge, Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.

over. N. S. Shaler, of the United States Geological Survey, in a report published in 1891, had the following to say with reference to "the common brown ant":

On a field in Cambridge, Mass., observations made during two summer seasons showed me that the average transfer of soil matter from the depths of the surface of the earth was in the aggregate sufficient to form a layer each year having a thickness of at least one-fifth inch over the area on which the observation was made, which is about 4 acres in extent.

Shaler points out that although ants do not have the peculiar effect on the soil of those insects which pass it through the digestive canal, "Nevertheless, because they are much more widespread than their lower kindred, these insects in the aggregate produce a far greater influence on the soil."

Hundreds of species of ants inhabit the soil and work in decaying wood. Termites, while generally destructive, are important in that they disintegrate vegetation and otherwise aid in soil formation. This is especially true in the Tropics and in the southern portions of this country. Dung beetles not only aid in soil aeration but also carry into the soil considerable quantities of manure. On a certain area of pasture land in Kansas an entomologist found that one species of this group of beetles made 200 burrows per acre. Some of these were nearly 2 feet deep and in them were buried 21 pounds of air-dried dung. Many species of beetles, cicadas, bees, wasps, and insects of other groups live more or less within the soil and contribute to its aeration and renovation.

Insects have demonstrated only too strikingly and too often their importance as destroyers of our forest resources and as creators of conditions favorable for floods and erosion. The precise effect of extensive defoliation of trees by such insects as the gypsy moth, the spruce budworm, the pandora moth, and the hemlock looper on the retention of moisture has not been determined, but there is no doubt that such extensive defoliation weakens the trees so that they are more susceptible to destruction by storms. The killing of trees by such insects as bark beetles sets the stage for devastating fires followed by floods and erosion. Insects such as white grubs are often responsible for the destruction of forest nursery stock so vital to a large-scale reforestation program, and many insects are concerned with the destruction of seeds necessary to natural reseeding of forest areas.

Shifts in crops or agricultural practices, such as the bringing under cultivation of extensive areas or the withdrawal of such areas from agricultural production, are nearly always accompanied by troublesome insect problems. Propagation of such destructive insects as the beet leafhopper, various species of grasshoppers,

and cotton flea hoppers takes place on weed-covered areas during the transformation from cultivated crops to grasses and other permanent vegetation.

Soil conservation is so intimately tied up with cropping methods, and the latter with insect problems, that these interrelations must be given careful consideration. In many instances there is at hand too little definite information to indicate just what may be expected from a given procedure. Quite often results may be influenced considerably by local or seasonal conditions.

In a list of 50 important insect pests of corn, wheat, and red clover in Illinois, compiled by entomologists working in that State, 8 of the corn pests are found among the pests of wheat and only 3 species are serious pests of all 3 of those crops. This suggests the opportunity presented to farmers of arranging a crop rotation that will minimize the danger of building up to serious proportions a number of insect pests.

Clean culture, though conducive to erosion, is of much importance in combating certain insect pests. For example, the infestations of the southern corn rootworm may be avoided by practicing clean culture until the eggs are deposited, as this pest will not lay its eggs on bare soil.

Destruction of crop residues, while objectionable from the erosion point of view, is often an important step in combating a pest, as in the case of the European corn borer and other insects which hibernate in fields.

Strip farming may favor certain destructive insects if the crops are not carefully selected with respect to insect relationships. For instance, the planting of grain in strips with intervening strips summer fallowed seems to be favorable to the lesser migratory grasshopper. The eggs of this species are laid in the unplowed stubble, and upon hatching the young hoppers immediately enter the adjacent crop. Strip planting which brings corn and grain close together is likely to intensify chinch bug injury, and many other examples of undesirable crop combinations might be cited.

Fall plowing is objectionable in areas where erosion is an important matter, but leaving fields unplowed is favorable to many pests such as bollworms, cutworms, strawworms, and the hessian fly. Time of cultivation, types of cover crops grown and turned under, and many other cropping practices may have a direct and important bearing on insect depredations.

Soil-improvement undertakings through the extensive planting of legumes is intimately associated with the welfare of the honeybee. The swing from legumes to cash crops during and subsequent to the World War had a disastrous effect on the soil and has resulted

in a marked decline in the number of honeybees in the agricultural West. The extensive planting of legumes in soil-improvement work is dependent on an ample supply of seed, and bees are a necessary factor in producing satisfactory seed yields. Bees also play an important part in the production of cultivated fruit and of fruit and seeds upon which wildlife depends.

Overgrazing is not only an important cause of wind and water erosion but it, coupled with intermittent farming, has served to intensify one of the most serious insect problems of the West—that of the beet leafhopper. This insect transmits the curly top disease of sugar beets, tomatoes, and other crops. Heavy losses from curly top are associated with the occurrence of high populations of the beet leafhopper. These high populations are produced as a result of the availability to the insects of extensive areas of summer weeds, such as Russian thistle, bract scale, and fogweed, growing on intermittently farmed lands, and of winter weeds, especially plantain, peppergrass, and mustard, which appear on vast overgrazed areas.

The impounding of water for flood control, irrigation, or power projects, for maintenance of water table, or for the purpose of fostering wildlife often results in the production or intensification of certain insect problems. Mosquitoes are the pests usually involved. These insects are of such tremendous importance because of the role they play as annoyers, and in the transmission of malaria and other diseases of man and animals, that they must be considered in connection with nearly all water manipulations. By recognizing this fact in planning such projects, the more serious aspects of the problem often may be taken care of as the work progresses.

Insects and related forms have a very direct relation to wildlife conservation. Many species are important as parasites or carriers of diseases of wild birds and animals. Some wild animals serve as hosts for species which are highly important as pests of man or domestic animals. This is illustrated by the cattle tick problem in Florida. In this instance deer serve to maintain the cattle tick on ranges which, if it were not for these animals, would be freed of ticks by the dipping of the cattle or by the removal of domestic animals from the pastures. Thus the eradication of the cattle tick from the United States—a job which was apparently nearly completed—is now confronted with a new and perplexing obstacle.

This article presents merely an indication of the many ways in which insects, one of the most destructive forces with which man must contend, may affect a conservation program. The rather obvious point

might be made here that insect control is in itself an important conservation measure, since the loss to man through insect depredations in the United States each year has been estimated at the enormous sum of 3 billion dollars.

Much direct or indirect information on the relation of insects to conservation procedure has been obtained by research workers in the Department of Agriculture and in various State experiment stations, yet enough fundamental facts have not yet been gleaned upon which to base answers to many of the questions. Some of these answers are being sought by research organizations, and no doubt the large-scale conservation program now under way will provide others.

While the Windbreak Grows

A North Dakota cooperator is not merely waiting for his 30 acres of trees and shrubs to reach full growth before he does something about wind erosion. Bert Phair, near Park River, is farming his land in strips, alternating fallow or other clean-cultivated land with small grain and similar cover. He leaves the stubble anchored on top of his land as a protective covering against wind erosion and to catch snow. In addition, Mr. Phair cleans and cultivates his 2½-year-old windbreak four or five times a year with the duck-foot, disk, and cultivator. He says that he can clean his entire windbreak in a day's time.

STATISTICAL TABLES FOR BIOLOGICAL, AGRICULTURAL, AND MEDICAL RESEARCH. R. A. Fisher and F. Yates. London and Edinburgh, 1938.

Statisticians and research workers in many fields especially biology, agriculture, and medicine should find this book indispensable. The tables which the authors have brought together may be placed in three groups as follows: (1) Tables which have been published and in use for some time; (2) tables that were not readily available or that are not entirely new; and (3) tables which afford aid in computations. The first group contains, chiefly, those distributions which are used frequently in tests of significance. Among the tables of the second group, persons actively concerned with agronomic research will find those on angular transformations, Latin squares, incomplete blocks and orthogonal polynomials especially valuable. Tables of logarithms, squares, reciprocals and other such aids in computation contained in the third group are, of course, available in other places but it is a great convenience to have them available in the same book with the first and second groups.

In the 22-page introduction the authors have discussed the various tables and explained their use. A number of examples has been provided to illustrate important uses of some of the tables. In addition a most pertinent and useful discussion of interpolation with examples has been included.

The size of page, 8½ by 11 inches, limits this book to desk use. It has, however, enabled the printer to produce tables that can be used with a minimum of eye strain and of errors due to reading.—Dr. A. E. Brandt.



BOOK REVIEWS AND ABSTRACTS

By Phoebe O'Neill Faris



SEVEN LEAN YEARS. By T. J. Woofter, Jr., and Ellen Winston. University of North Carolina Press. May 1939.

One closes this extraordinarily illuminating study of depression years with the firm conviction that problems of rural distress should be approached from "down under," that the educational road is the true road, and that there is no insurmountable difficulty to a people willing and eager to search out the way and follow it. It is for this reason that the book is discussed in this issue of *SOIL CONSERVATION*. The soil conservation districts idea does get "down under," to the human element as well as the soil element of the widespread movement for rural reconstruction. Better to understand what it is that we are working for, the great complexity of the rural pattern of today, it is suggested that at least several hours of several days or nights be given over to careful and sympathetic reading of this volume which the authors have aptly called "Seven Lean Years"—especially by those of us who are working in soil conservation.

There is nothing emotional about the presentation; it is, in fact, a rather austere telling, in cold facts and figures, of troublous times in rural America "because of sweeping changes acutely felt but only dimly understood." The thoughtless, or the individual little concerned, may ask, Why should we be reminded, thus starkly and somberly, of suffering and poverty in millions of farm families, whether temporarily or permanently "submerged"? The answer definitely is this: It is only by pointing out causes of the present agricultural economic situation, trends, relief costs and needs, relationships of agriculture and industry as indicated by present trends, consequences of land misuse and population increase in poor areas, errors—it is only thus that long-time preventive measures can be envisioned and worked out for the future, that it may not happen again. Can it be done? And why not, in America? Nothing should be impossible, in the United States.

The authors have worked for several years in the Division of Research of the Federal Emergency Relief Administration and the Works Progress Administration, and they have taken a great bulk of facts contributed by rural research staffs and fused the whole into a nontechnical analysis of fundamental aspects of maladjustment, present and past, in rural areas. They point out, also, urgent needs for readjustment in special areas; and by illuminating the facts concerning destitute people in such areas they contrive to offer constructive suggestions for alleviating distress both through emergency measures and decade- and century-long planning. The whole study ties in closely with the hopes and plans and operations of the Soil Conservation Service.

A particularly vivid picture is given of mass suffering, and high emergency-relief costs, in part-time farming areas. Millions of farm people, especially youth, dependent for opportunity and income upon small rural industry—lumbering, mining, rural manufacturing; collapse of such industries and "ghost" villages; to the city, back to the small farm, relief on the farm and in the city, to the city again and back to the farm for an illusion of safety; a mad scramble, with unrest and the evil consequences of installment and farm mortgage. In 1928 the farm mortgage debt amounted to 9½ billions of dollars. Largely contributing to rural-relief costs were farmers who had lost their lands through mortgage foreclosures, with tenants turned adrift. But it was the part-time farming areas, with stranded villages and small worn-out farms, that came earliest to the relief rolls, stayed longest, suffered most.

In a discussion of past and present trends leading toward insecurity in agriculture Dr. Woofter and Dr. Winston point out in no indefinite terms the extraordinary difficulties that must be surmounted in coordinating mechanization, population increase, and

production control, in working out a fundamental solution of the submerged farmers' problems to prevent future rural emergencies. Poorest farming areas have highest population increase; mechanization, employing less manpower, tends to increase; demand for agricultural products increases with population increase provided the buying power of the people permits. The three appear to be irreconcilable, yet as one reads on, the outlook works its way toward more hopeful thinking. Correction of land ills, conservation of good soils, adequate health services in the poorer rural areas, vocational training and opportunity guidance for the great army of youth faring forth each year from these areas, migration guidance, improved distribution of tax money—these and other measures work for the good of a great many depressed areas, work slowly but work. And, these measures are fundamental. A population policy, urged by the authors of "Seven Lean Years," might conceivably be a natural outcome of consistently applied efforts, pursued with determination and much thoughtful planning, to correct fundamental ills of the poorer rural areas.

Two chapters of the book present a finely drawn and comprehensive picture of the status of landless and low-income families of rural areas and the effect of such groups on the relief problem. Tenancy receives broad treatment, and the share-cropper's plight is painted in all its hideousness with cold figures as the impressive media. Areas of special problems are treated convincingly—the cotton and corn areas, the "agricultural fringes," ghost-village areas. And then the broad regions of chronic distress, including eastern cotton, western cotton, Appalachian-Ozark, Lake States cut-over, spring wheat, winter wheat. These are areas of stagnant trade and agricultural hazards, high-birth rates, and deplorable living conditions. Drought distress in the high plains where it is possible to gage the ebb and flow of people with the climatic pulse is analyzed chiefly from the point of view of recent emergency relief—in 1935 one out of every five families in the Great Plains was on the relief rolls, farmers, merchants, doctors, teachers. Carefully correct figures and statements are given to point out causes, handicaps of farm laborers and farm owners, and other relief households.

In the final chapter of the book, Relief and Reconstruction, we look for some bright ray of hope. We find it in these words: "Much of the distress which these [relief] expenditures helped alleviate has been shown to be preventable, and all possible measures should be taken to guarantee that the situation which caused that distress shall not arise again." We have learned of the mutual dependence of industry and agriculture; the extent of rural slums, some of long standing; that the pioneering era is gone forever; that a long-range program of conservation of the land is imperative; that the submerged rural group exists today, the result of exploitative agriculture and that it should not be permanent if land use and social education is properly applied; that relief of unemployables and employables are separate, specialized processes. And we have learned to weigh with care work relief and direct relief.

Above all, the final chapter of Dr. Woofter's and Dr. Winston's book should be read for an understanding of unemployment as a normal phenomenon of the economic system rather than the result of a passing emergency. The goal of farm relief should be to reestablish them as farmers—on a permanent basis. Certainly, as stated in the end, "widespread need must not occur again."

If the pattern of agriculture is favorable to wildlife, then wildlife will be abundant. If the pattern is unfavorable, or only fair, then we shall have wildlife in proportion.



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